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| EXAMINER |
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LIU, SAMUEL W

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| ART UNIT | PAPER NUMBER |
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1653

DATE MAILED: 07/02/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/540,024

Applicant(s)

TZIANABOS ET AL.

Examiner

Samuel W Liu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-146 is/are pending in the application.
- 4a) Of the above claim(s) 37-146 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6 and 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Applicants' preliminary amendment filed 18 September 2000 (Paper NO: 3) and request for the extension for two months filed 18 September 2000 (Paper NO: 3) have been entered.

Election/Restrictions

Applicant's election of Group I, Claims 1-36 filed 6 May 2002 (Paper NO:12) is acknowledged. Because applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). In view of Applicants' election, Claims 37-146 are withdrawn from consideration as directed to non-elected invention. Therefore, the elected claims 1-36 are examined in this Office Action.

Drawing

The drawing (one figure only) filed 3 March 2000 is acceptable subject to correction of the informalities indicated on the attached "Notice of Draftperson's Patent Drawing Review," PTO-948. In order to avoid abandonment of this application, correction is required in reply to the Office action. The correction will not be held in abeyance.

The following is the information on how to effect drawing changes.

1. New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings MUST be filed within the THREE MONTH shortened statutory

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period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136(a) or for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948. All changes to the drawings, other than informalities noted by the Draftsperson, must be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings must be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

In addition, Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.85(a). Failure to take corrective action within the set period will result in abandonment of the application.

Objection to Specification

The disclosure is objected to because of the following informalities:

- (1) In page 15, line 30, the term "PS A" should be spelled out in full for the first time.
- (2) In page 36, line 29, "PSA" should be changed to "polysaccharide A" or to "PS A".

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 19 are indefinite in the recitations (i) "less than 50 kilodaltons" because the recitation vaguely defines biochemical properties of the claimed polymer; what is molecular weight range and is it supposed to encompass 1 KDa? (ii) the recitation "composed of ...a negative charge" because the repeating charge motif cannot be composed of a single negative charge and because "a negative charge" characterizes physiochemical feature of a charged (or ionic state) molecule; (iii) the recitation "separated by an intervening sequence of at least 32 Å"; what does this 32 Å refer to? Does it refer to dimension occupied by the intervening molecular structure or to calculated distance separated by the intervening molecule? Also, therein, the term "at least" is not apparent as to what is an upper limit for the separation between the said repeating charge motifs. Dependent claims are also rejected.

In addition, the recitation "separated by an intervening sequence" in Claim 1 and the recitation "separated by a distance of at least 8 amino acids" in Claim 9 are not apparent because there is no upper limit of the said distance and it is unclear as to how many amino acid residues would be encompassed in the distance.

Claim 3 is indefinite as to the part of the polymer that repeats and whether or not the repeating unit is a charge motif or a non-charge motif. If the repeating unit refers to charge motifs, this does not further limit the claim. See also Claim 4 as to identical repeating units.

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Claim 7 is indefinite as to the term "peptide-nucleic acid" because it is unclear regarding whether or not amino acid residues are scattering within a polynucleotide, or a peptide fragment is covalently linked to a polynucleotide; or whether or not it refers to peptide nucleic acid (PNA) a DNA mimic.

Claim 8 is unclear as to the recitation "at least 10 repeating charge motifs"; how many motifs are encompassed in the claim? The same are Claims 9-10, 13, 16, 17, 22-26, 28-30 and 33-34.

Claim 27 and 36 are indefinite because the recitation "any neural amino acids" is unclear as to whether or not apart from naturally-occurring amino acids: Arg, Lys, Glu, Asp and His, any non-naturally-occurring amino acids are encompassed? whether or not the said neutral amino acids are referred to any amino acids having no net charges under certain pH inasmuch as the "neural" state is pH-dependent; for instance, histidine's pKa is approximately 6.0 in water; thus, at neutral pH, the histidine residue will be neutral depending chemical environment of the residue.

Claim Rejections - 35 USC §103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 6 and 7 are rejected under 35 U.S.C. 103(a) as being obvious over Simmons, G. C. et al (*Bioorg. Med. Chem. Lett.* (1998) 7, 3001-3006) taken with Basu, S. et al (*Biorg. Chem.* (1997) 8, 481-488) and Nielsen, P. E. (*Nature Biotechnology* (1999) 10, 71-75)

Simmons, G. C. et al disclose a peptide nucleic acid polymer that is less than 50 KDa and has repeating positively charge motifs which separated by hydrophobic and bulky amino acid residues (see table I), as applied to Claim 1 of the instant application regarding the same subject. While Simmons et al do not teach a pharmaceutical composition comparing the biopolymer, the developed peptide nucleic acid polymer offers favorable properties for cellular targeting upon cell-uptake based peptide moiety or nucleic acid moiety or both.

Basu et al. teach a mixed polymer, i.e. peptide nucleic acid-peptide conjugate (especially, see Figure 2), as applied to Claims 6 and 7 of the instant application having limitations of "a mixed polymer" (Claim 6) and "the mixed polymer is a peptide-nucleic acid", and a peptide-nucleic acid" (Claim 7); and the conjugate displays higher uptake than the non-conjugated polymer.

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Nielsen teaches peptide nucleic acid can be used for gene therapeutic drug application (see conclusion section), as applied to Claim 1 of the instant application with regard to claimed polymer for pharmaceutical use.

Given the above motivation of Simmons et al, Basu et al and Nielsen one ordinary skill in the art would have combined the teachings of Simmons et al, Nielsen and Basu et al; when combined, it would have result in synthesis (see Figure 2: synthetic scheme for assembly of PNA-peptide conjugate presented by Basu et al) of pharmaceutically active mixed biopolymer (see the teaching of Nielsen et al), which is peptide nucleic acid or peptide nucleic acid-peptide conjugates of the structural feature of repeating charge motif and physical property (e.g. molecular weight < 50 KDa) (see the teaching of Simmons et al) as described in the claims of the instant application; and when combined, a skilled artisan would have applied the synthesized peptide nucleic acid as an immuno-modulator to treat bacterial infection mediated abscess formation.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Wei Liu whose telephone number is (703) 306-3483.

The examiner can normally be reached from 9:00 a.m. to 5:00 p.m. on weekdays. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Christopher Low, can be reached on 703 308-2923. The fax phone number for the organization where this application or proceeding is assigned is 703 308-4242 or 703 872-9306 (official) or 703 872-9307 (after final). Any inquiry of a general nature or relating to the status of this

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application or proceeding should be directed to the receptionist whose telephone number is 703

305-4700.

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June 30, 2002

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